International Journal of Educational
Science and Research (IJESR)
ISSN(P): 2249-6947; ISSN(E): 2249-8052
Vol. 5, Issue 5, Oct 2015, 31-36

MULTIPLE INTELLIGENCES TEACHING AND ASSESSMENT: ITS INFLUENCES ON FILIPINO COLLEGE STUDENTS' MATHEMATICS PERFORMANCE AND LEARNING EXPERIENCES

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ABSTRACT

The study aimed at integrating multiple intelligences theories in teaching and assessing Mathematics performance of college freshmen students in a state university in the Philippines. The research adopted the semi-experimental design of unequal groups utilizing two intact classes to explore the effects of multiple intelligences teaching and assessment on the experimental group, versus that of the traditional lecture-discussion method on the control group.The achievement posttest results of the two groups revealed that the students in the multiple intelligences teaching group performed significantly better than the students in the traditional instruction group. Furthermore, students in MI group showed more positive learning experiences.

KEYWORDS: Multiple Intelligences, Learning Styles, Student Achievement, Learning Experiences

INTRODUCTION

In the traditional system of teaching, which is purely classical, there is an assumption that all students will learn the knowledge and skills presented to them through the one method utilized by the teacher. In the Philippine educational setting particularly the tertiary level, the traditional method of lecture-discussion is prevalently used. This, however, does not give opportunity for students to learn and grow based on their own preferred mode of learning. Students are left alone in their own devices to figure out how to adjust so that they can cope with the standards. There is a continuous slide of students' performance in Mathematics in the Philippines. Thus, there is an evident need to explore other perspectives to teaching and learning Mathematics that will address students' differences and multiple intelligences.

An American psychologist, Howard Gardner (2011), developed the theory of multiple intelligences. His theory states that people have different intelligences and learn in many different ways. Furthermore, according to this theory, no two individuals have exactly the same profile of intelligences.He suggests that humans have eight intelligences: verbal-linguistics, logical-mathematical, visual-spatial, bodily-kinesthetic, musical-rhythmic, interpersonal, intrapersonal, and naturalistic. Learning intelligences of students has something to do with how they learn. It may be shaped by intelligence preferences, gender, culture or learning style. The opportunity to learn in ways that make learning more efficient is also likely to make learning more effective. Attention to a student's preferred mode of learning or thinking promotes improved achievement (Tomlinson, 1999).Students will have optimum learning if the concepts, principles and skills being taught are presented in their learning style and they are able to express themselves well.

In multiple intelligences teaching, teachers should first evaluate their own intelligence before carrying out multiple intelligences teaching, and use their dominant intelligence in planning materials and lesson plans. They should

also keep track of student performances with observations and written records. This can help to assess each student's intelligence and provide support accordingly.On the other hand, multipleintelligences assessments are usually done by the instructor, the collaborativeteachers, and students. This makes the assessments more interactive and unbiasedthan traditional assessments, which are done by the instructors alone. Theassessment of multiple intelligences should be a variety of interesting, substantially beneficial and mutually corresponding activities.

In the face of successful studies on the use of multiple-intelligencesabroad and locally, it would be interesting to examine the effects of multiple intelligences teaching and assessment on the Mathematics performance and learning experiences of the tertiary students in the Philippines. Thus, this study endeavored to find out if there would be anincrease teaching effectiveness through the incorporation of multiple intelligences teaching.

METHODOLOGY

The purpose of this study is to make a comparative analysis on the effects of multiple-intelligences teaching and assessment, and traditional lecture-discussion methods on the Mathematics performance and learning experiences of freshmen college students.

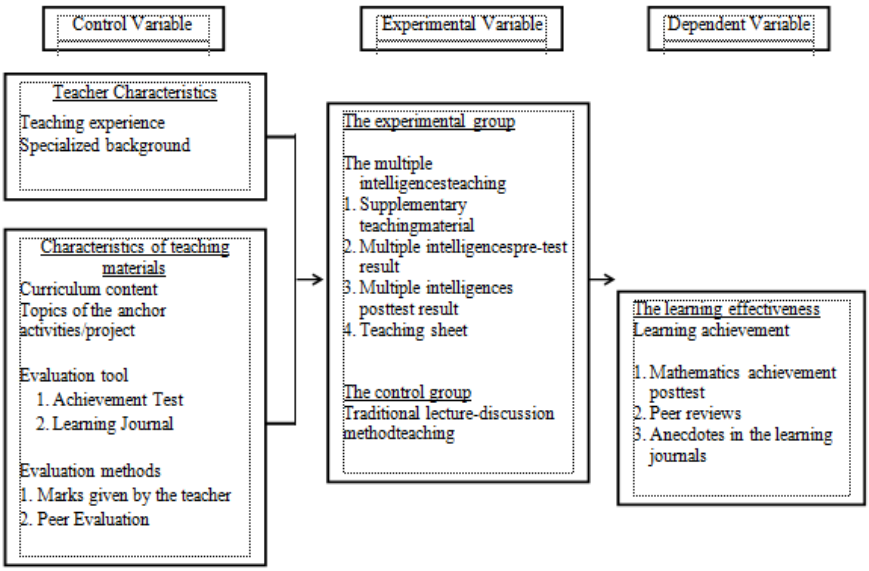

Figure 1: Research Framework

This research framework (shown in Figure 1) was divided into three variables: (1) Control variables: This is the variable that were controlled in order tominimize the effects on experimental results. The students in the experimental groupand control group were all from the same major, same year level, had the sametextbooks, same course content, sameassessment tools, and same instructor. (2) Experimental variable: The students in the experimental group weregiven multiple intelligences supplementary material in class, whereas the controlgroup used traditional teaching methods and had no supplementary materials. (3)The dependent variables: The difference in learning effectiveness between studentsfrom the experimental group and students from the control group and the responses in their learning journals.

The study employed semi-experimental design of unequal groups. The participants were two intact sections of college freshmen from Bulacan State University.To ensure equivalence between the two intact groups, students were

pretested prior to experimentation and the results of their pretest were used as the covariate in the study.

The instruments used were the adopted multiple intelligences inventory developed by Howard Gardner (2011) and the achievement test in Math 123 – Plane Trigonometry.The development and validation of the achievement test followed this process: planning the test, face validation, first validation, item analysis, second trial run and final run and evaluation of the test. This was done prior to the conduct of the experiment.

The researcher administered the multiple intelligences inventory to the students in the experimental group at the start of the semester. Students were encouraged to answer this inventory honestly.The achievement test was then administered to the control and experimental groups to determine the extent and depth of their knowledge in Math 123-Plane Trigonometry.The researcher taught both the experimental and control groups. In the experimental group,the researcher carefully studied the results of the students' learning style inventory and their achievement test.The results served as the basis in adjusting the instruction and assessment to the identified learning needs of the students in the experimental group.Varied instructional materials and formats were provided to the students in each lesson based on their identified learning styles.Flexible grouping was consistently used in the instruction.However, students were allowed to work alone if this was found to be their best modality of learning.While some students preferred to read about the topic, or listen to others discussing it, others claimed to acquire knowledge by manipulating objects associated with the content. Thus, the lessons were presented in a variety of ways by the teacher, using different instructional materials.

The students were also given anchor activities to make learning continuous. Some students even suggested activities that they find interesting. They were also given the freedom to choose to work alone or in groups. They presented their work to the class. A group of students who are greatly visual/spatial learners created a design for shirt printing using the graphs of sine, cosine and tangent functions.Students who are dominantly verbal-linguisticlearners made interesting interviews to some professionals like engineers, architects, and even criminology specialist to learn how Trigonometry is being used in their careers. They presented the information they gathered to the class. In addition, a group composed a song integrating all functions of special angles and its corresponding value. On the other hand, one group of students made an interesting presentation on the common mistakes of students in Plane Trigonometry. Students were able to present the misconceptions and defined the corrections. The students were also asked to evaluate their classmates' presentations.

The students were also asked by the instructor to work on a learning journal wherein guide questions were given every week. Anecdotal notes, portfolios, projects, and journal writing were some of the assessment tools used to monitor students' progress. The journal showed that students were more interested to do real-life applications of mathematics. They were motivated when they could apply what they were learning in school to real-life situations.

Shown below are some of the activity worksheets and students' outputs.

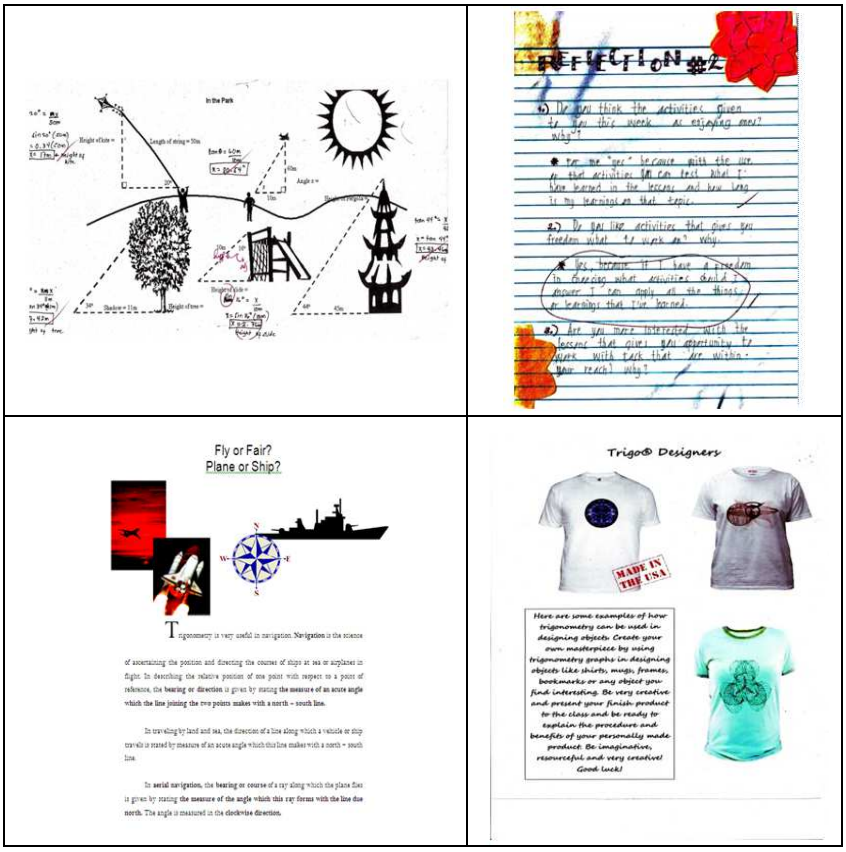

Figure 2: Sample Worksheets, Journal Reflections and Student Outputs

Students in the control group were taught using the traditional lecture-discussion method. The teacher-researcher discussed the lessons in the lecture-format and the students were given seatwork and written activities afterwards. They were also given assignments once in a while.

The following statistical tests were used in the study: (a) t-test for dependent samples to determine if there was a significant difference between the pretest and posttest scores of the students in each learning group; and (b) Analysis of Covariance to determine if there was a significant difference between the mathematics achievement of the students in the experimental and control groups.

RESULTS AND DISCUSSIONS

The teacher has shown logical-mathematical and visual-spatial as her dominant intelligences. It is therefore recommended that the teacher should carefully design and incorporate his/her strengths into classroom activities and evaluations to help students improve their achievement and interest in the subject.

Table 1: Learning Profiles of the Students in the Experimental Group

Gender	Population N=30	Intelligences	Average	Standard Deviation	T-Value
Male Female	5 25	Verbal/Linguistic	25.2 22.3	3.83 4.56	1.33
Male Female	5 25	Visual/Spatial	24.4 21.3	5.12 4.54	1.37
Male Female	5 25	Intrapersonal	27.2 22.3	6.42 4.8	1.99*
Male Female	5 25	Interpersonal	28.4 25.2	2.7 5.17	1.35
Male Female	5 25	Logical/Mathematical	29.2 22.8	4.32 4.77	2.79*
Male Female	5 25	Musical/Rhythmic	23.8 20.6	4.76 4.91	1.34
Male Female	5 25	Bodily/Kinesthetic	21.4 19.3	4.72 4.65	0.92
Male Female	5 25	Naturalist	25.8 21.8	5.27 5.07	1.61

Note. * p< .05.

Table 1 shows that generally the multiple intelligences scores of the male respondents were higher than that of the female respondents. The male respondents in the experimental group scored significantly higher than the female respondents in the intrapersonal and logical/mathematical intelligences. This indicates that the male students prefer more to work alone and they are highly into problem solving, critical thinking and deductive reasoning.

To determine the mathematics achievement of the students in the multiple intelligence teaching and lecture-discussion instruction groups, the pretest and posttest mean scores of the students including the standard deviations were obtained.

Table 2: Comparison of the Pretest and Posttest Mean Scores

Groups	Pretest			Posttest			T - Value
	Mean	Verbal Interpretation	SD	Mean	Verbal Interpretation	SD	
Multiple Intelligences Teaching (N=30)	12.6	Satisfactory	3.87	32.1	Excellent	4.11	26.02
Traditional Instruction (N=30)	16.9	Satisfactory	5.65	23	Very Satisfactory	5,19	11.16

Table 2 reveals the computed t-value of the comparison of the pretest and posttest scores of the students in the experimental group was 26.02 indicating that their posttest mean score was significantly higher than their pretest mean score. This indicates that significant learning took place took place. It shows that modifying instruction is more likely to result in greater student engagement and increased achievement. On the other hand, the computed t-value in comparing the pretest and posttest means scores of the students in the traditional instruction group showed that the students got a higher posttest mean score which also indicated that they had additional learning.

To determine whether there was a significant difference between the achievement of the students in the multiple intelligences teaching and lecture-discussion instruction groups, the Analysis of Covariance (ANCOVA) was utilized using the pretest scores of the respondents as the covariate.

In comparing the posttest mean scores of the multiple intelligences teaching and the lecture-discussion instruction groups, the computed F-value (20.01) indicates a significant difference. It implies that the students who experienced teaching that recognizes their unique learning styles improve better in their performance in Mathematics.

The learning journals of the students in the multiple intelligences teaching reveal more positive learning experiences.Students became more responsible, cooperative and disciplined. Multiple intelligences could not only provide teachers with more choices in teaching and assessment methods, but also allow students to demonstratewhat they have learned in many different ways that help increase students' motivation and interest. Here are some of the unedited responses of the students in their journals when asked about their perception on the use of multiple intelligences teaching and assessment.

"I find it enjoying working with my group mates because everyone shared their knowledge in answering the activity. They helped me to analyzed and understand the lesson."

"I'm so happy working with them because they help me with my learning. They also gave me a chance to share

my ideas with them and I listen to their ideas too."

"It contributed learning to me. I learned to be open-minded, serious and give patience in answering a difficult problem."

Gardner's theory of multiple intelligences suggests that schools should offer individual-centered education, having curriculum tailored to a child's intelligence preference (Allan & Tomlinson, 2000). It suggests that schools should recognize and respond to the diverse learning styles of students and allow students more room to express themselves,placing equal attention and reassurance on those who show gifts in any one of theeight intelligences.

CONCLUSIONS

The findings of the study indicate that responding to the different learning styles of students can better improve their mathematics performance and increase their interest and motivation in the subject. Furthermore, even college students can benefit from teaching strategies that regard them as individuals with unique ways of learning.Also, assessment of students' performancemust be designed in such a way that students can exhibit what they had learn through their own preferred ways. It is therefore recommended that college instructors should explore beneficial teaching strategies that respond to the learning styles of students.

REFERENCES

1. Allan, S.D. & Tomlinson, C.A. (2000). Leadership for differentiating schools and classrooms. Alexandria VA: ASCD.
2. Gardner, H. (2011). Frames of mind: The theory of multiple intelligences. NY: Basic Books.
3. Tomlinson, C.A. (1999). The differentiated classroom: Responding to the needs of all learners. Alexandria, VA: Association for Supervision and Curriculum Development.